

## CHAPTER 3

# PREENGINEERED PRODUCTION LIFTS

This chapter provides requirements for the design, evaluation, and performance of preengineered production lifts. This lift designation may be used at the discretion of the contractor for selected operations.

<b>3.1</b>	<b>GENERAL</b> .....	3-1
<b>3.2</b>	<b>OPERATION EVALUATION</b> .....	3-2
3.2.1	Load Identification .....	3-2
3.2.2	Task Determination .....	3-2
3.2.3	Hazards Evaluation .....	3-2
3.2.4	Equipment/Rigging Selection .....	3-2
<b>3.3</b>	<b>LIFTING FIXTURES</b> .....	3-3
3.3.1	Design .....	3-3
3.3.2	Fabrication .....	3-3
3.3.3	Inspection and Testing .....	3-3
3.3.4	Storage, Maintenance, and Control .....	3-3
3.3.5	Modification and Repair .....	3-4
<b>3.4</b>	<b>PROCEDURES</b> .....	3-5
3.4.1	Content .....	3-5
3.4.2	Development .....	3-5
3.4.3	Preparation and Revision .....	3-5
3.4.4	Approval .....	3-6
3.4.5	Review .....	3-6
3.4.6	Use .....	3-6
<b>3.5</b>	<b>DESIGNATED LEADER</b> .....	3-7
<b>3.6</b>	<b>TRAINING</b> .....	3-8
3.6.1	Equipment Operation .....	3-8
3.6.2	Procedure .....	3-8

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## 3.1 GENERAL

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- a. A preengineered production lift is a repetitive, production-type lifting operation that is independent of the nature of the load to be lifted. Also, the probability of collision, upset, or dropping is reduced to a level acceptable to the responsible manager by preliminary operation evaluation, specialized lifting fixtures, detailed procedures, operation-specific training, and performance of independent review and approval of the entire process.
- b. The preengineered production lift is a specialized lift performed by production personnel. The required procedures and controls ensure the safety of the operation and set this category of lift apart from traditional hoisting and rigging activities

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## 3.2 OPERATION EVALUATION

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The following procedure should be used to determine if a lifting operation qualifies as a preengineered production lift.

### 3.2.1 LOAD IDENTIFICATION

- a. Identify the identical items or group(s) of identical items to be respectively lifted. Items must have the same dimensions, weight, and center of gravity to be considered identical.
- b. Determine the dimensions, weight, center of gravity, and method of attachment of the items.

### 3.2.2 TASK DETERMINATION

- a. Determine the parameters of motion using the following as applicable:
  1. Lifting, rotation, speeds, and travel directions.

2. Actions required with or adjacent to the load.
3. Other lifting operation details that affect safety and stability of the load.

### 3.2.3 HAZARDS EVALUATION

Determine the consequences that could result from collision, upset, or dropping the load.

### 3.2.4 EQUIPMENT/RIGGING SELECTION

- a. Determine the type, class, and minimum capacity of lifting equipment (hoist, crane, forklift, etc.) required for the operation based on the identified load, task, and hazards.
- b. Define the type of lifting fixtures required to safely accomplish the required task.

### 3.3 LIFTING FIXTURES

#### 3.3.1 DESIGN

- a. Special lifting fixtures and rigging accessories shall be designed according to recognized consensus standards (29 CFR 1910, Occupational Safety and Health Standards for General Industry; 29 CFR 1926, Occupational Safety and Health Regulations for Construction; ASME B30.9, "Slings," B30.10, "Hooks," B30.20, "Below-the-Hook Lifting Devices," etc.), and the lifting fixture design requirements in Chapters 12 and 14 ("Rigging Accessories" and "Below-the-Hook Lifting Devices," respectively).
- b. The designer of special lifting fixtures shall be:
  1. A member of a qualified engineering organization.
  2. Qualified in machine design.
  3. Knowledgeable of special lifting fixture design requirements.
- c. The designer shall determine the requirements for initial and periodic inspections or tests, including acceptance/rejection criteria and periodic inspection/test intervals.
- d. Special lifting fixture designs shall receive a documented review by another member of a qualified engineering organization and the responsible oversight organizations (safety, quality assurance, etc.).
- e. Deviations in design that may result in design factors less than consensus standard requirements shall require documented justification and approval of the designer's manager and the manager of the responsible oversight organizations (safety, quality assurance, etc.).
- f. Applications not specifically addressed in the ASME standards or in this standard may be approved by the responsible manager and oversight organizations (safety, quality assurance, etc.) when justification and

documentation are provided and all other provisions of this section are met.

#### 3.3.2 FABRICATION

Special lifting fixtures shall be fabricated according to the specifications of the approved design package.

#### 3.3.3 INSPECTION AND TESTING

- a. Before initial use of each special lifting fixture, a qualified inspector shall perform a documented acceptance inspection and test on it. This process shall include:
  1. Verification of configuration of the fixture against the design drawing specifications.
  2. Nondestructive examination as specified in the approved design package.
  3. Proof-testing as specified in the approved design package.
- b. Personnel performing the lift shall visually inspect special lifting fixtures before use for visible signs of wear, deformation, deterioration, or damage. Records are not required.
- c. A qualified inspector shall conduct periodic, documented inspections as required by the design organization. In addition to looking for visible signs of wear, deformation, deterioration, or damage, these inspections shall verify the current configuration of the fixture against that specified in the approved design package.
- d. Equipment to be used (cranes, hoists, forklifts, etc.) shall be inspected according to the appropriate section requirements in this standard for that type of equipment.

#### 3.3.4 STORAGE, MAINTENANCE, AND CONTROL

- a. Lifting fixture users shall do the following:

1. Store special lifting fixtures in an appropriate location to prevent damage or deterioration.
2. Perform and document periodic preventive maintenance as required by the design organization.
3. Establish controls to ensure that special lifting fixtures are used only in the operations for which they were designed.
4. Maintain equipment to be used (cranes, hoists, forklifts, etc.) according to the appropriate section requirements in this standard for that type of equipment.
5. If equipment maintenance procedures deviate from published manufacturer's recommendations, the alternate procedures shall be approved in advance by the manufacturer or another qualified person and be kept readily available.

### **3.3.5 MODIFICATION AND REPAIR**

- a. Modification to special lifting fixtures shall be designed, approved, and fabricated according to Sections 3.3.1, and 3.3.2, ("Design," and "Fabrication," respectively).
- b. Following modification or repair of a load-bearing element of a special lifting fixture, the fixture shall be inspected and tested according to the initial use requirements in Section 3.3.3, "Inspection and Testing."

## 3.4 PROCEDURES

A detailed, approved, step-by-step procedure shall be developed for the entire operation.

### 3.4.1 CONTENT

- a. At a minimum, each procedure shall contain the following information:
  1. Identification of the load to be lifted.
  2. Identification of the specific lifting fixtures to be used in the operation.
  3. Identification by class and capacity (if applicable) of the types of equipment to be used, such as cranes and hoists.
  4. Verification that all equipment, fixtures, and accessories are operative, up-to-date on required periodic inspections and maintenance, and are in good condition before the operation begins.
  5. Specific instructions for attachment of the lifting fixtures to the load and to the lifting equipment.
  6. Parameters of motion required for the operation.
  7. Specific instructions for removal of the lifting fixtures from both the load and the lifting equipment.

### 3.4.2 DEVELOPMENT

- a. The methods for developing new procedures, including standard procedure formats, should be clearly defined. Administrative procedures or writers guides should direct the development and review process for procedures at each site to ensure consistency at the site.
- b. Qualifications for procedure writers shall be considered, including operating organization and experience.
- c. Procedures should reference applicable source documents, such as facility design documents, safety analysis documents, vendor technical manuals, and industry standards.

- d. Operating procedures should contain only one action per step.
- e. Any necessary warnings, cautions, or notes should be easily identifiable and should not contain any action statements. These items should precede the step to which they apply and should appear on the same page as the step to which they apply.
- f. The sequence of procedural steps should conform to the normal or expected operational sequence.
- g. Procedures should be developed with consideration for the human-factor aspects of their intended use. For example, references to components should exactly match drawing and label-plate identifiers, and units should be the same as those marked on applicable instrumentation. Important factors should be highlighted, such as operating limits, warnings, and cautions.

### 3.4.3 PREPARATION AND REVISION

- a. Appropriately trained personnel shall develop, review, and approve a step-by-step procedure for each lifting operation. The responsible oversight organizations (safety, quality assurance, etc.) shall participate in the review process.
- b. Before its first use in the actual production process, the procedure shall undergo a formal verification and validation process using walk-throughs or similar methods to ensure that the steps are appropriate and correct. Any discrepancies found during this process shall be corrected and the process repeated until the procedure is correct.
- c. Any changes to an existing, approved procedure shall be performed according to the process specified above. The change shall be evaluated to determine whether the revised procedure must be revalidated and reverified.

**3.4.4 APPROVAL**

- a. Before each procedure is validated, it shall be reviewed and approved by the following personnel:
  - 1. Author of the procedure.
  - 2. Representative of a qualified engineering organization.
  - 3. Representatives of the responsible oversight organizations (e.g., safety, quality assurance).
- b. After each procedure is validated, it shall be reviewed and approved by the following personnel:
  - 1. Author of the procedure.
  - 2. Representative of a qualified engineering organization.
  - 3. Representatives of the responsible oversight organizations (i.e., safety, quality assurance).
  - 4. Management of the facility where the procedure will be performed.
  - 5. Management of the production organization performing the procedure.
- c. Revisions of procedures shall receive the same depth of review and level of approval as the initial versions received.

All procedures, either new or revised, shall be approved before use.

**3.4.5 REVIEW**

- a. Approved procedures should be reviewed at periodic intervals to ensure that their information and instructions are technically accurate and that appropriate human-factor considerations have been included.
- b. The frequency of reviews should be specified for each procedure; it may vary with the type and complexity of the activity involved.
- c. Applicable procedures should be reviewed after an incident.
- d. During each review, procedures should be compared to source documents to verify their accuracy.

**3.4.6 USE**

- a. A copy of the current issue of the approved procedure shall be in the work area when the operation is performed.
- b. Deviations from the approved procedure are not allowed during normal operations.
- c. The requirements for use of procedures should be clearly defined and understood by all personnel.
- d. If a procedure is determined to be deficient, a procedure change shall be initiated before operations continue.
- e. Personnel performing the procedure may take whatever action is necessary during emergency conditions to return the process to a safe and stable condition without first initiating a procedure change.



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### 3.5 DESIGNATED LEADER

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- a. Each time a preengineered production lift requiring more than one person is performed, a designated leader shall be present at the lift site during the entire operation.
- b. Leadership designation may be by written instructions, specific verbal instruction for the particular job, or clearly defined responsibilities within the crew's organizational structure.
- c. The designated leader's responsibility shall include the following:
  1. Ensure that the personnel involved have received proper and current training and qualification for the procedure.
  2. Ensure that the equipment and accessories specified in the procedure are available.
  3. Survey the lift site for hazardous or unsafe conditions.
  4. Ensure that equipment is properly set up and positioned.
  5. Ensure that a signaler is assigned, if required, and identified to the equipment operator.
  6. Direct the lifting operation to ensure that it is done safely and efficiently.
  7. Stop the job when any potentially unsafe condition is recognized.
  8. Direct emergency stabilization operations if an accident or injury occurs.

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## 3.6 TRAINING

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Specialized training shall be conducted for personnel involved in performing preengineered production lifts. This training shall be periodically reviewed and approved by the responsible operating and oversight organizations (safety, quality assurance, etc.).

### 3.6.1 EQUIPMENT OPERATION

- a. Personnel shall be trained and qualified on the specific types of equipment required.
- b. The equipment operation training shall include:
  1. A demonstration by the individual of operational competence with the equipment.
  2. A demonstration of appropriate safe operating practices.
  3. Documented evidence of the individual's knowledge of safety-related information.

- c. Equipment-operation training shall be repeated for personnel whenever a new or different type of equipment is introduced into the procedure.

### 3.6.2 PROCEDURE

- a. Personnel shall be trained and qualified in the proper execution of each specific procedure.
- b. The procedure training shall include:
  1. A demonstration by the individual of operational competence in performance of the procedure.
  2. Documented evidence of the individual's knowledge of the steps and requirements of the procedure.
- c. Training on a procedure shall be repeated periodically or when a modification to the procedure results in a significant change in the operation.